

DECLASS
By Licensing & Review

RESTRICTED
DECLASS
By Licensing & Review

I Claim:-

1. A (fibre) reinforced metal rotor comprising a hub, a rim and a member extending radially between and interconnecting the hub and the rim, the (fibre) reinforced metal rotor having an axis of rotation,

the fibre reinforced metal rotor having at least two rings of (fibres) arranged integrally within the (fibre) reinforced metal rotor,

a first ring of (fibres) being arranged substantially at a first radial distance from the axis of rotation, a second ring of (fibres) being arranged substantially at a second radial distance from the axis of rotation and the second radial distance is greater than the first radial distance,

the first ring of (fibres) being arranged in the hub of the (fibre) reinforced metal rotor.

2. A fibre reinforced metal rotor as claimed in claim 1 wherein the second ring of fibres is arranged in the rim of the (fibre) reinforced metal rotor.

3. A fibre reinforced metal rotor as claimed in claim 1 wherein the fibre reinforced metal rotor comprises a metal selected from the group comprising titanium, titanium aluminide, an alloy of titanium, or (any suitable metal), [alloy and intermetallic which is capable of being bonded].

4. A fibre reinforced metal rotor as claimed in claim 1 wherein each of the rings of (fibres) comprises a (fibre) selected from the group (comprising) silicon carbide, silicon nitride, boron, alumina and (other suitable fibres).

5. A fibre reinforced metal rotor as claimed in claim 1 wherein the fibre reinforced metal rotor has at least one rotor blade.

6. A fibre reinforced metal rotor as claimed in claim 5 wherein the at least one rotor blade is integral with the fibre reinforced metal rotor.

7. A fibre reinforced metal rotor as claimed in claim 5 wherein the at least one rotor blade has a root arranged to

DECLASS
By Licensing & Review

DECLASS
By Licensing & Review
RESTRICTED

BRITISH RESTRICTED

14

fit in a groove in the rim of the ^{fiber} fibre reinforced metal rotor.

8. A ^{fiber} fibre reinforced metal rotor as claimed in claim 1 wherein the ^{fiber} fibre reinforced metal rotor has an outer radius, ^{R_o} the outer radius is at least about 0.5 ^{meters} metres.

9. A fibre reinforced metal rotor as claimed in ~~any of~~ claim 1 ~~to 8~~ comprising a plurality of axially spaced rotor discs, at least one of the rotor discs having at least two rings of fibres, each rotor disc having a plurality of rotor blades extending radially therefrom, a stator spaced from the rotor by a clearance, at least one annular spacer extending axially between and secured to an upstream rotor disc and a downstream rotor disc, the at least one annular spacer being fibre reinforced to limit the radial movement thereof and hence the clearance between the rotor and the stator.

10. A rotor as claimed in claim 9 wherein the stator comprises a casing surrounding and spaced radially from the rotor blades by a clearance, the at least one annular spacer being fibre reinforced to limit the radial movement thereof and hence the clearance between the rotor and the stator.

11. A rotor as claimed in claim 9 wherein the stator comprises a stator vane assembly surrounding and spaced radially from the annular spacer by a clearance, ~~the at least one annular spacer being fibre reinforced to limit the radial movement thereof and hence the clearance between the rotor and the stator.~~

12. A rotor as claimed in claim 11 wherein the annular spacer has at least one circumferentially extending rib to define a labyrinth seal with the stator vane assembly.

13. A rotor as claimed in claim 9 wherein the at least one annular spacer is a ^{fiber} fibre reinforced metal spacer.

14. A rotor as claimed in claim 9 ~~to 15~~ wherein all the rotor discs are ^{fiber} fibre reinforced metal discs, the ^{fiber} fibre reinforced metal disc being reinforced by at least two rings of fibres.

BRITISH RESTRICTED

DECLASS
By Licensing & Review

RESTRICTED
DECLASS
By Licensing & Review

Suit 9
15. A rotor as claimed in claim 13 wherein the fibre reinforced metal spacer comprises a metal selected from the group comprising titanium, titanium aluminide, an alloy of titanium, and any suitable metal, (alloy or intermetallic which is capable of being bonded.

C
C
16. A rotor as claimed in claim 9 wherein the reinforcing fibres ^{fibers} comprises a ^{fiber} fibre selected from the group ^{consisting of} comprising silicon carbide, silicon nitride, boron, ^{and} alumina ^{and other} suitable fibres.

C
17. A rotor as claimed in claim 9 wherein there are plurality of annular spacers.

C
C
18. A rotor as claimed in claim 9 wherein the ^{fiber} fibre reinforcement in the annular spacer is selected to provide sufficient stiffness to the annular spacer to ^{minimize} minimise radially outward movement of the annular spacer relative to the upstream rotor disc and downstream rotor disc.

C
19. A rotor as claimed in claim 18 wherein the ^{fiber} fibre reinforcement in the annular spacer is selected to provide sufficient stiffness to the annular spacer to match the radially outward movement of the annular spacer, the upstream rotor disc and the downstream rotor disc.

C
20. A rotor as claimed in claim 9 wherein the ^{fiber} fibre reinforcement in the annular spacer is selected to provide sufficient stiffness to the annular spacer to produce radially inward movement of the annular spacer relative to the upstream rotor disc and downstream rotor disc.

21. A rotor as claimed in claim 9 wherein the rotor is a compressor rotor or a turbine rotor.

22. A rotor as claimed in claim 1 wherein the rotor is a gas turbine rotor.

agts
DECLASS
By Licensing & Review

DECLASS
By Licensing & Review